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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/995,222	11/27/2001	Lars Langemyr	801939/111	9649

7590 02/07/2006  
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EXAMINER

SHARON, AYAL I

ART UNIT PAPER NUMBER

2123

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/995,222	<b>Applicant(s)</b> LANGEMYR ET AL.	
	<b>Examiner</b> Ayal I. Sharon	<b>Art Unit</b> 2123	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/7/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Introduction***

1. Claims 1-26 of U.S. Application 09/995,222 filed on 11/27/2001 are presented for examination.
2. Applicants have amended independent claims 1 and 14, and added new claims 27-39.
3. Examiner acknowledges the filing of an RCE on 10/07/2005. the RCE was improper because it was filed as a response to a non-final office action. The amendment has been treated as a response to a non-final office action.
4. This action applies new 35 U.S.C. § 101 rejections to claim 1. This office action is therefore non-final.

### ***Priority***

5. Examiner has reviewed the priority applications 60/253,154 and 60/222,394, and finds that they provide disclosure for the claimed invention. The request for priority is therefore granted.

***Drawings***

6. This application has been filed with informal drawings that are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

***Claim Rejections - 35 USC § 101***

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. An invention which is eligible for patenting under 35 U.S.C. § 101 is in the “useful arts” when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. *The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a “**useful, concrete and tangible result.**”* The test for practical application as applied by the examiner involves the determination of the following factors:

(1) “Useful” - The Supreme Court in *Diamond v. Diehr*, 450 U.S. 175, 209 USPQ 1 (1981) requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished. Applying utility case law the examiner will note that:

(a) the utility need not be expressly recited in the claims, rather it may be inferred.

(b) if the utility is not asserted in the written description, then it must be well established.

(2) "Tangible" - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium that enabled its functionality to be realized.

(3) "Concrete" - Another consideration is whether the invention produces a "concrete" result. Usually, this question arises when a result cannot be assured. An appropriate rejection under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

9. **Claims 1-39 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** The Examiner respectfully submits that the claimed invention does not recite *a useful, tangible result*. The claims are not concrete because the cited claims do not clearly define the output of the invention (the "result"). Independent claims recite the output of "producing a model", but Examiner finds this result to be simply a mathematical construct and therefore is not tangible. Examiner also finds that the claimed result is so

broadly phrased that it is not useful because it is not sufficiently specific to be applied for a practical use.

10. **Claims 1-13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** Amended independent claim 1 is directed to a mathematical algorithm, which is an abstract idea, and therefore is not patentable. Dependent claims 2-13 inherit this defect.

***Claim Rejections - 35 USC § 112***

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term “system” is used in the claims to refer to three different concepts: (1) a set of equations (see claim 1: “partial differential equation system”); (2) physical phenomena or physical apparatuses (see claim 1: “a model of a combination of systems”) and (3) the claimed invention (see claim 27: “A system for producing ...”).
13. The term “system” is therefore vague and indefinite, so the claims are therefore vague and indefinite.

***Indication of Allowable Subject Matter***

14. The following indicates how the claimed subject matter in independent claims 1, 14, and 27 overcomes the cited prior art. The claims are currently rejected under 35 U.S.C. § 101, and therefore are not currently allowable.

15. Claims 1 and 14 utilize "at least one non-local coupling" to determine a representation of a partial differential equation system. According to the specification (see p.31 of the PG-PUB of the instant application: U.S. PG-PUB 2003/0105614; or see p.118 of the filed specification):

Variables in FEMLAB are generally evaluated locally their value at each evaluation point is computed using information only from their evaluation point. In contrast, the value of a *coupling variable* is the result of a computation carried out elsewhere in the geometry or even in another geometry altogether. When used in the PDE and boundary conditions, the result is the introduction of non-local dependencies – *extended* multiphysics - as opposed to ordinary multiphysics, which refers to dependencies between variables in [the] same geometric location.

The coupling variables are extremely powerful in their ability to make the values of an expression available non-locally. The coupling variables are not only useful for modeling coupled problems - they can also be used solely for post processing and visualization purposes.

All coupling variables are defined in two steps. First define the *source*, i.e., the domains in which the evaluation takes place, the name of that evaluation, and the name given to the resulting variable; secondly define the *destination*, i.e. the domains within which it is possible to use the resulting variable.

There are three kinds of coupling variables implemented: scalar, extrusion, and projection.

16. The FEMLAB® Reference Manual, Version 1.0 is dated July 1998. This reference pre-dates the priority filing date of the instant application. It teaches:

- a. "The core of FEMLAB is a set of algorithms for discretizing and solving Partial Differential Equations (PDE)." (see pages 3-21 to 3-27. The quote is on page 3-21).
- b. The use of Dirichlet and generalized Neumann boundary conditions in the coefficient form of PDE (see page 3-23).
- c. The use of Jacobians to solve PDE in the coefficient form (see pages 3-26 to 3-27), and a non-linear solver for obtaining the Jacobians (see pages 3-60 to 3-66).
- d. The "weak form" (or "variational form") of the differential of the partial differential equation (see pages 3-40 to 3-41).

17. The FEMLAB® Reference Manual, Version 1.0, however, does not teach the use of "at least one non-local coupling" to determine a representation of a partial differential equation system.

18. The "FEMLAB 2.2: New Features" article teaches (see p.2):

Automatic Jacobian computation for non-local couplings is now supported. You can access dependent variables non-locally, define scalar coupling variables by coordinate values or integration, and couple field variables by projection or extrusion.

The copyright date of this article is 2001, which post-dates the priority filing date of the instant application, and therefore does not qualify as prior art.

19. The FEMLAB® Installation and New Features Guide, Version 2.3 teaches that one new feature in Version 2.3 was "Improved contact problem handling using non-local coupling and nonlinear boundary conditions" (see page 6-41).



20. According to FEMLAB® Installation and New Features Guide, Version 2.3, printing history for the previous versions of the FEMLAB® Installation and New Features Guide is as follows:

- a. October 2000, First Printing, FEMLAB 2.0
- b. March 2001, Second Printing, FEMLAB 2.1
- c. November 2001, Third Printing, FEMLAB 2.2
- d. November 2002, Fourth Printing, FEMLAB 2.3

21. Therefore, FEMLAB® Installation and New Features Guide, Version 2.3 confirms that both FEMLAB versions 2.2 and 2.3 post-date the priority filing date of the instant application, and therefore do not qualify as prior art.

22. The Anderson reference, "Iterative Procedures for Nonlinear Integral Equations" teaches the use of strong local coupling (see p.548, para.4; and p.549, para.4), and the use of Jacobians (see p.549-551) for non-linear integral equations. However, Anderson does not teach the use of non-local coupling, nor does Anderson expressly teach that his methods apply to Partial Differential Equations (PDE).

***Response to Amendment***

***Re: Claim Rejections - 35 USC § 101***

23. Examiner has withdrawn the 35 U.S.C. 101 rejections of claims 14-26 based on Applicants' amendments to the "computer program product" limitations.

24. Examiner has maintained the 35 U.S.C. 101 rejections of claims 1-26, and added rejections to claims 27-39 on the basis of a lack of a “concrete, useful, tangible” result.
25. Examiner has added new 35 U.S.C. 101 rejections to claims 1-13 on the grounds that the newly amended claims are directed to an abstract algorithm.

*Re: Claim Rejections - 35 USC § 112*

26. Examiner has withdrawn the 35 U.S.C. 112, first paragraph rejections of claims 1-9 and 14-22 based on lack of enablement. Examiner has reconsidered and found that the specification provides enablement for these claims.
27. Examiner has withdrawn the 35 U.S.C. 112, second paragraph rejections of claims 14-26 based on the “computer program product” limitations in response to Applicants’ amendment made to claim 14.
28. Examiner has applied new 35 U.S.C. 112, second paragraph rejections to claims 1-39 for the amendment adding conflicting uses of the vague term “system”.

*Re: Allowable Subject Matter*

29. The indication of allowability of claims 10-13 has been withdrawn.
30. Examiner has reviewed Claims 10-13, and found that their result does not overcome the 35 USC § 101 “lack of concrete, useful, tangible, results” rejection of independent claim 1 because the result to be simply a mathematical construct

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and therefore is not tangible. Examiner also finds that the claimed result is not useful, because it is not sufficiently specific to provide a practical application.

### ***Conclusion***

31. Applicant's arguments filed 10/07/05 have been fully considered but they are not persuasive.

### ***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached at (571) 272-3749.

Any response to this office action should be faxed to (571) 273- 8300, or mailed to:

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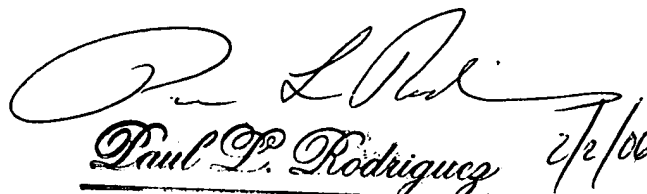
or hand carried to:

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401 Dulany Street  
Alexandria, VA 22314

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon  
Art Unit 2123  
January 31, 2006

  
Paul P. Rodriguez 2/2/06  
Primary Examiner  
Art Unit 2125